Supplemental Materials Appendix for
"Civil Service Adoption in America: The Political Influence of City Employees"

Sarah F. Anzia and Jessica Trounstine

This appendix presents supplemental description of the dataset and empirical results that are described but not shown in the article.

Supplemental data description

As we describe in the article, we digitized select tables from the yearbooks from 1934 to 1970. The Yearbooks are large compilations, and each Yearbook includes data tables covering a variety of different features of cities. For this project, we digitized the tables that (1) provide personnel management data, including information on cities' civil service provisions, (2) provide information on employee organizations, and (3) cover large numbers of cities, especially those that cover cities with 10,000 or more in population at the time of the data collection.

For our coding of the civil service variable for each city, we relied heavily on the personnel data tables from the 1940-1944 Yearbooks, because these were the earliest Yearbooks that included information about the year each city adopted civil service, back to the late 1800s, for cities with more than 10,000 residents. We also digitized tables from the pre-1940 Yearbooks because they include some information on whether cities had a civil service commission, or what kind of personnel agency cities had, but we opted not to include this in our coding because this is different information from what was tracked in later years. The relevant Yearbook tables from 1945 to 1962 no longer provide the date each city adopted civil service, but they do continue to report indicators of whether each city had civil service in that year, consistent with the information provided in the 1940-1944 tables. We therefore also used these 1945-1962 data tables to track whether cities had civil service in each year and to identify when cities switched to civil service, if they did so during that period. 1962 is the last year the Yearbooks contain civil service information for all cities with populations over 10,000.

In total, using the Yearbook personnel data tables from 1940 to 1962, we were able to code the civil service status of 1,674 cities for at least some years. For 583 of the cities, we were able to identify the date of civil service adoption directly from the 1940-1944 Yearbooks. According to the Yearbooks, 334 of the cities had not adopted civil service by 1962 (although 9 of those are shown to have adopted civil service in a year after 1962), and another 122 cities had not adopted civil service by the last year that the city appears in the Yearbooks. (For example, Shelby, NC, and Jamestown, ND, do not appear in the personnel data tables of the 1962 Yearbook, but they were included in those tables in earlier Yearbooks and—for those years—were only shown as not having adopted civil service.) There are also 304 cities listed as having civil service for all years in which data are available but for which the Yearbooks do not contain a date of adoption; cities in this group are excluded from our analysis because we do not know the timing of their adoption or whether they had civil service in any years before 1940. (The exception is Birmingham, AL. The Yearbooks indicate it had civil service as of 1940 but do not provide the year of adoption.)

Finally, there are 331 cities for which the Yearbooks indicate that the city's civil service status changed in years before 1963 but for which the Yearbooks do not provide the date of adoption. For these cities, we attempted to identify the exact year of adoption by drawing on all available information in the full set of Yearbooks. We coded each of these cities as having civil service for every year following the first indication of civil service in the Yearbooks; they are coded as not having civil service for all prior years. Using all of the information we had, we created a balanced panel dataset of all of the cities from 1883 to 1962 with the binary indicator *Civil service*. As others have noted, cities rarely eliminate civil service once it is adopted, so we code cities as having civil service for every year following initial adoption.

While we would like to have detailed information on which employees were covered by civil service for each of these years, the Yearbooks do not provide data on occupations covered until the 1940s. Moreover, even for the 1940s, the coverage information is only available for a subset of cities and uses codes that are difficult to interpret. For example, the 1940 Yearbook has data on coverage for only 135 cities in our dataset. 93 of those cities' civil service covered all employees, 36 covered police and fire only, 4 covered police only, and 2 covered firefighters only. The next year the coverage variable is included, 1942, includes 438 cities, but 45 are listed as having coverage through the state, which does not clearly indicate which employees in the city are covered. (Of the remaining cities with 1942 information, 230 covered all employees, 130 covered police and fire only, 22 covered police only, and 11 covered firefighters only.) Given the unavailability of these coverage data before 1940, plus the limited number of cities included and challenges of interpretation, we were unable to include employee coverage variables in our analysis.

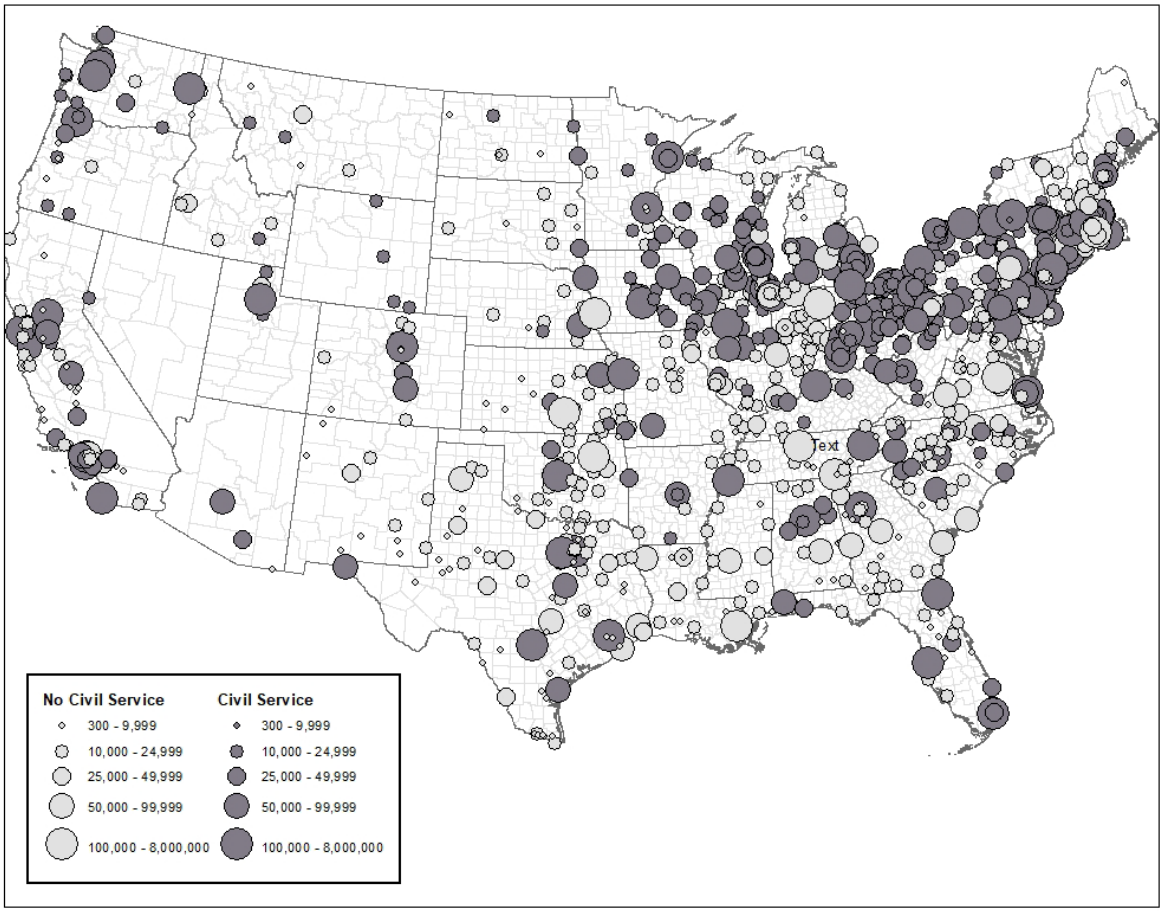
We also relied on the 1938-1940 Yearbooks to code our indicators of municipal employee organizations. The Yearbooks for those years include lists of municipal employee organizations and, for each organization, the year it was established. The ICMA assembled these lists by acquiring directories of a few prominent national-level employee organizations and then listing their local chapters in each state. The national-level organizations included were the IAFF, AFSCME, SCMWA, and the National Civil Service Association (NCSA). In addition, it lists some large local employee organizations that were not affiliated with national organizations, such as local organizations in Chicago, Milwaukee, Los Angeles, and Detroit.[1] Police

[1] The 1938 Municipal Yearbook (Moore 1938, 339) reports: "Employee organizations are on the march. In city, county, state, and national governments employees are taking an increased interest not only in retirement systems and the protection of the merit system, which are traditional bases of organization, but also in welfare activities and other conditions of employment." It describes the 1938 data as "a directory of the local chapters or organizations affiliated with all national federations of municipal employees…The picture is, however, not complete. It does not take into account the host of skilled workers employed by cities who belong to their own craft unions, which in some cities exercise great influence in behalf of their municipal employee members, nor does it include a vast number of benevolent, protective, and social organizations which are organized along functional lines, particularly in police departments. The task of securing accurate data on the latter two types of organizations proved impractical if not impossible" (ibid). The 1940 Municipal Yearbook reports that "these data

organizations are conspicuously absent from the list, and we found many scattered instances of reports in news articles of local employee organizations that were considering national affiliation, but had not yet cemented this relationship. After 1940, the Municipal Yearbooks stopped reporting the initial date of establishment of IAFF and other city employee locals, although they do include information about the presence of IAFF and other employee locals in each of those later years.

Figure A1 shows a map of the cities included in our dataset. The dots are scaled by city size and shaded to show whether they had or had not adopted civil service by 1940. This helps to illustrate the number of cities in each region, the distribution of city size within our dataset, as well as the relationship between city size and civil service adoption by 1940, which we discuss in the article and below.

Figure A1: Map of cities in dataset, by city size and civil service adoption by 1940



were obtained from the national and state affiliates in February, 1940" (*Municipal Year Book* 1940, 144).

Supplemental empirical results

Figure A2 shows the proportion of cities that had adopted civil service by year (corresponding to Figure 2 of the article), excluding cities for which we could not determine the date of civil service adoption.

Figure A2: Proportion of cities adopting civil service by year

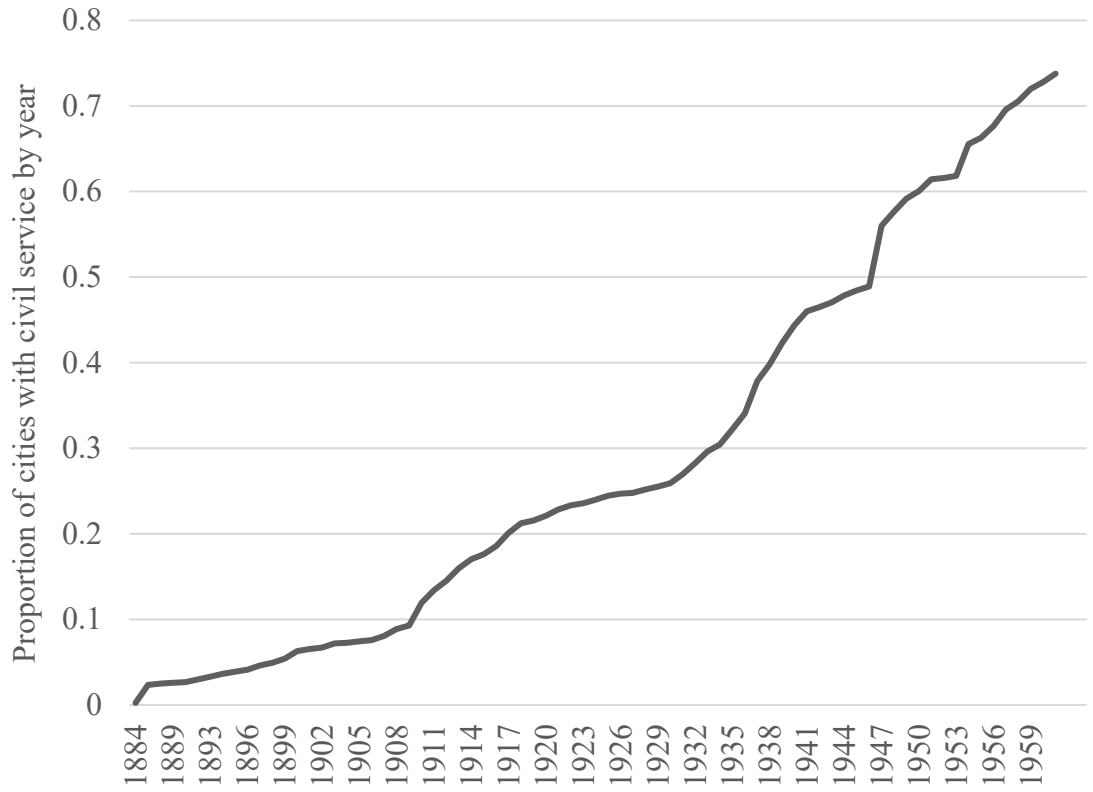


Table A1 reproduces the results of Table 2 of the article but estimated with logistic regression rather than OLS. Then, in Table A2, we estimate the models from Table 2 with a stricter coding of the dependent variable. As we describe in the article, for a small number of cities, we approximated the date of civil service adoption and included those cities in the main models in the article. In Table A2, however, we exclude the cities for which we had to approximate the date of civil service adoption.

Table A1: Logistic regression

	(1)	(2)	(3)	(4)
IAFF	1.291***			1.028***
	(0.285)			(0.304)
Any municipal employee organization		1.216***		
		(0.316)		
IAFF or firefighter benevolent association			1.208***	
			(0.257)	
Population (logged)	0.962***	0.954***	0.897***	1.584***
	(0.115)	(0.123)	(0.116)	(0.127)
% Foreign born	-0.377	-0.289	-0.526	-1.369
	(1.769)	(1.809)	(1.765)	(1.35)
% Illiterate	-7.109**	-6.79**	-7.151**	-6.564***
	(3.268)	(3.07)	(3.011)	(1.571)
% Black	-2.916	-2.956	-2.881	-1.857
	(1.973)	(1.95)	(1.915)	(1.506)
State civil service law	1.017**	1.035**	0.973**	
	(0.472)	(0.476)	(0.470)	
Pseudo R-squared	0.274	0.270	0.270	0.516
Observations	1,211	1,211	1,211	1,102

Notes: Dependent variable is presence of civil service law in the city in 1940. Logistic regression estimates with standard errors clustered by state in parentheses. Models 1-3 include regional fixed effects; model 4 includes state fixed effects. *p<0.10, **p<0.05, ***p<0.01 (two-tailed)

Table A2: Strict coding of civil service adoption

	(1)	(2)	(3)	(4)
IAFF	0.257***			0.15***
	(0.055)			(0.044)
Any municipal employee organization		0.238***		
		(0.062)		
IAFF or firefighter benevolent association			0.253***	
			(0.053)	
Population (logged)	0.151***	0.149***	0.138***	0.151***
	(0.019)	(0.021)	(0.019)	(0.017)
% Foreign born	-0.014	0.001	-0.053	-0.332*
	(0.349)	(0.360)	(0.344)	(0.178)
% Illiterate	-0.938***	-0.902***	-1.027***	-0.604**
	(0.309)	(0.298)	(0.272)	(0.249)
% Black	-0.367	-0.367	-0.351	-0.209
	(0.234)	(0.236)	(0.230)	(0.148)
State civil service law	0.188**	0.19**	0.179**	
	(0.084)	(0.085)	(0.084)	
R-squared	0.32	0.32	0.32	0.55
Observations	1,155	1,155	1,155	1,155

Notes: Dependent variable is presence of civil service law in the city in 1940, excluding observations where adoption date is approximate. OLS estimates with standard errors clustered by state in parentheses. Models 1-3 include regional fixed effects; model 4 includes state fixed effects. *p<0.10, **p<0.05, ***p<0.01 (two-tailed)

In Table A3 we re-estimate the models in Table 2 with several variations. In models 1 and 2 we lag the IAFF indicator by one and five years. In model 3 we add population nonlinearly. In model 4 we exclude cities located in the three states that passed early state level requirements for municipal civil service: New York, Massachusetts, and Ohio. Model 5 includes the log of the number of city employees, from the 1939 Yearbook, for the set of cities for which that information is available. The coefficient on logged total employment is not significant, nor is logged population in that model, because the two are highly correlated.

Table A3: Lags, semiparametric estimation, excluding early-adopting states, city employment

	(1)	(2)	(3)	(4)	(5)
IAFF (1-year lag)	0.250***				
	(0.056)				
IAFF (5-year lag)		0.208***			
		(0.057)			
IAFF			0.213***	0.239***	0.209***
			(0.056)	(0.057)	(0.057)
Logged population	0.153***	0.167***		0.159***	0.061
	(0.019)	(0.019)		(0.018)	(0.057)
% Foreign born	-0.113	-0.132	-0.049	-0.060	-0.199
	(0.352)	(0.357)	(0.354)	(0.256)	(0.329)
% Illiterate	-0.944***	-0.948***	-0.910***	-1.256***	-0.908*
	(0.302)	(0.301)	(0.295)	(0.330)	(0.494)
% Black	-0.383*	-0.361	-0.398*	-0.215	-0.421
	(0.214)	(0.217)	(0.213)	(0.176)	(0.311)
State civil service law	0.177**	0.170*	0.183**	0.044	0.19*
	(0.083)	(0.086)	(0.083)	(0.064)	(0.104)
Total employees 1939 (logged)					0.064
					(0.052)
R-squared	0.31	0.29	0.12	0.29	0.23
Observations	1,211	1,211	1,211	998	794

Notes: Dependent variable is presence of civil service law in the city in 1940. OLS estimates with standard errors clustered by state in parentheses. Models include regional fixed effects; model 3 includes population non-linearly. Model 4 excludes cities from NY, MA, and OH. Model 5 includes logged number of city employees from the 1939 Yearbook. *p<0.10, **p<0.05, ***p<0.01 (two-tailed)

In Table A4, we present the results of additional model specifications in which we interact the employee organization variables with measures of city size. As we discuss in the main article, the coefficient on the interaction term is always negative, but the statistical significance of the coefficient depends on the model specification. In column 1, we re-estimate the model from column 1 of Table 2, interacting the IAFF indicator with logged city population (centered around its mean). In column 2, we replace the IAFF indicator with the indicator for whether the city had any employee organization in 1940. In both models, the interaction term is negatively signed and statistically significant.

Table A4: Interaction of employee organization and city population, additional models

	(1)	(2)	(3)	(4)	(5)	(6)
IAFF	0.269***		0.394***	0.273***	0.251***	0.241***
	(0.057)		(0.111)	(0.100)	(0.058)	(0.058)
Logged population	0.190***	0.201***			0.204***	0.150***
	(0.022)	(0.028)			(0.026)	(0.030)
IAFF * Logged population	-0.092**				-0.076*	-0.047
	(0.034)				(0.043)	(0.034)
Any employee organization		0.244***				
		(0.060)				
Any employee org.		-0.100**				
* Logged population		(0.037)				
Population bin			0.145***			
			(0.018)			
IAFF * Population bin			-0.053*			
			(0.032)			
Population quintile				0.128***		
				(0.016)		
IAFF * Population quintile				-0.021		
				(0.031)		
% Foreign born	-0.092	-0.071	-0.062	-0.038	-0.067	-0.265
	(0.349)	(0.355)	(0.347)	(0.331)	(0.351)	(0.334)
% Illiterate	-0.924***	-0.897***	-0.936***	-0.967***	-0.936***	-1.046**
	(0.296)	(0.286)	(0.307)	(0.292)	(0.305)	(0.450)
% Black	-0.380*	-0.385*	-0.379*	-0.369*	-0.363*	-0.466
	(0.206)	(0.206)	(0.204)	(0.206)	(0.210)	(0.293)
State civil service law	0.178**	0.183**	0.184**	0.181**	0.174**	0.224**
	(0.083)	(0.084)	(0.083)	(0.082)	(0.086)	(0.099)
R-squared	0.32	0.31	0.31	0.33	0.3	0.23
Observations	1,211	1,211	1,211	1,211	1,164	929

Notes: Dependent variable is presence of civil service law in the city in 1940. Standard errors clustered by state in parentheses. Models include regional fixed effects. Model 5 excludes outliers (as described in text above). Model 6 excludes cities with less than 10,000 in population.

Because there are some very large and very small cities in the dataset, in columns 3-6 we consider whether our estimate of the coefficient on the interaction term is sensitive to outliers at either end of the population range. First, in column 3, we replace the logged population variable with a population bin indicator: it equals 0 for cities with fewer than 5,000 residents, 1 for cities with 5,000 to 9,999 residents, 2 for cities with 10,000 to 24,999 residents, 3 for cities with 25,000 to 49,999 residents, 4 for cities with 50,000 to 99,999 residents, and 5 for cities with 100,000 residents or more. As we show in Table A4, column 3, when we interact that population bin variable with the indicator for IAFF, we still estimate a negative coefficient on the interaction term, significant at the 10% level in a two-tailed test. Then, in column 4, we operationalize the city population variable in terms of quintiles and interact that 0-to-4 population variable with IAFF. The coefficient on the interaction of IAFF and population quintile is not statistically significant; see column 4. Column 5 returns to the main specification and excludes cities that

had population that was either 1.5 times the interquartile range lower than the first quartile or higher than the third quartile. The interaction term remains negative and significant. But in column 6, where we drop cities with less than 10,000 in population, the coefficient estimate on the interaction term shrinks in magnitude and is no longer statistically significant at conventional levels.

In Table A5, we present additional model estimates for the results presented in Table 3 of the article. First, because we lose some observations when we add logged population to the model, we reproduce the results from column 1 (which excludes logged population as a predictor) using only observations that are included in column 3 of Table 3 in the article. The estimated coefficient on IAFF remains positive and statistically significant. In column 2, we expand the years of the model from 1890 to 1940 to take advantage of the full time span of our data, and then we limit it to 1910 to 1940, the three-decade period prior to 1940 in which most IAFF adoption and civil service adoption occurred. In both cases, we estimate a positive, statistically significant association between IAFF organization and civil service adoption. In column 4 we replace logged population with change in logged population over the previous 10 years. In column 5 we exclude cities located in three states that passed state level requirements for municipal civil service: New York, Massachusetts, and Ohio.

Table A5: Additional two-way fixed effects models

	(1)	(2)	(3)	(4)	(5)
IAFF	0.200***	0.233***	0.149***	0.194***	0.205***
	(0.020)	(0.022)	(0.017)	(0.020)	(0.022)
Logged population		-0.038***	0.001		-0.018
		(0.012)	(0.012)		(0.012)
Pop change				-0.023**	
				(0.010)	
R-squared (within)	0.20	0.24	0.15	0.21	0.18
Observations	49,101	58,791	38,180	45,976	40,734

Notes: Dependent variable is presence of civil service law in city-year. Model 1 excludes city-years for which we do not have population data. Model 2 includes 1890-1940. Model 3 includes 1910-1940. Model 4 includes population change. Model 5 excludes NY, MA, and OH.

Next, in Table A6, we estimate models with IAFF organization lagged. Columns 1-3 present estimates with IAFF lagged by one year, two years, and five years, respectively. In all cases, the coefficient estimate on IAFF strong and positive. As we explain in the article, we also consider it likely that in some cases, civil service helped IAFF to organize, even though our focus in the article is on the pathway by which city employees contributed to civil service adoption. To account for this possibility, in column 4, we include both a one-year lag and lead of IAFF. Column 5 also adds a two-year lag and lead of IAFF. The results suggest that civil service did precede IAFF in some cases—the lead coefficients are positive—and also that IAFF contributed to civil service in others: the coefficients on both the one- and two-year lags of IAFF are positive and statistically significant in both models.

Table A6: IAFF lags and leads (1900-1940)

	(1)	(2)	(3)	(4)	(5)
IAFF (1-year lag)	0.2***			0.085***	0.048***
	(0.020)			(0.018)	(0.013)
IAFF (2-year lag)		0.201***			0.038*
		(0.022)			(0.021)
IAFF (5-year lag)			0.184***		
			(0.025)		
IAFF (1-year lead)				0.126***	0.021**
				(0.016)	(0.010)
IAFF (2-year lead)					0.111***
					(0.016)
Population (logged)	-0.023*	-0.023*	-0.023*	-0.028*	-0.032***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
R-squared (within)	0.2	0.2	0.19	0.20	0.19
Observations	49,101	49,101	49,101	47,807	46,539

Notes: Dependent variable is presence of civil service law in city-year. Models include city and year fixed effects. *p<0.1, **p<0.05, ***p<0.01.

In Table A7, we estimate separate models for the 1910s, the 1920s, and the 1930s (through 1940) to assess whether the relationship between IAFF organization and civil service adoption was roughly the same throughout this long time period. All cities are included in these models, but only for the years spanning the particular decade. The results show clear positive relationships between IAFF and civil service adoption during the 1910s and 1930s. For the decade of the 1920s, however, there is no clear relationship between the two, which is most likely because as we discuss and show in the article, the 1920s was a slow decade for both employee activism and civil service adoption.

Table A7: Estimates by decade

	(1) 1910s	(2) 1920s	(3) 1930s
IAFF	0.066**	-0.011	0.111***
	(0.028)	(0.008)	(0.020)
Logged population	-0.052***	-0.020*	0.019
	(0.018)	(0.012)	(0.032)
R-squared (within)	0.07	0.02	0.11
Observations	11,752	12,410	14,018

Notes: Dependent variable is presence of civil service law in city-year. Standard errors clustered by city in parentheses. Model 1 includes 1910-1919, model 2 includes 1920-1929, and model 3 includes 1930-1940.

In the last few years, scholars have identified problems with the use of two-way fixed effects regressions for estimating the causal effect of a policy (or treatment) on an outcome of interest. In order for a two-way fixed effects estimator to be unbiased for an average treatment effect, not only must the parallel trends assumption hold (although see Roth et al. (2023) for discussion), but the treatment effect must be constant over time and between groups (see de Chaisemartin and

D'Haultfoeuille 2023). Recognizing that the latter assumption often does not hold, in the last few years, a large number of methodological papers have proposed alternative estimators. For example, Goodman-Bacon (2021), de Chaisemartin and D'Haultfoeuille (2020), and Imai and Kim (2018) consider staggered adoption of a binary treatment, and for applications such as this, de Chaisemartin and D'Haultfoeuille (2020) develop the DID_M estimator. Callaway and Sant'Anna (2021) and others have also developed estimators for dynamic treatment effects. All of these heterogeneity-robust estimators are developed to address problems with using two-way fixed effects regression to estimate the causal effect of a treatment, and all depend on some form of a parallel trends assumption holding (e.g., Callaway and Sant'Anna (2021) allow for a conditional parallel trends assumption).

The argument we advance in the article is a causal argument: that employee agency, as measured by local IAFF organization, contributed to the adoption of civil service. But while our main independent variable (IAFF) does change in different years for different cities, and while its relationship to civil service adoption seems to have changed over time (and is different for different types of cities, as we discuss in the article), because of challenges of causal inference, we cannot conclude that the coefficient estimates in Tables 2 and 3 are the average treatment effect. As we discuss in the article, we consider it likely that in some cities, civil service promoted IAFF development (or that some cities had characteristics that led to both civil service and IAFF establishment). At the same time, it is clear that in many cities, the organization of firefighters helped to push forward the adoption of civil service. What our quantitative analysis shows, then, is that places with organized employees were more likely to adopt civil service—that there is a strong empirical link between the two. Moreover, with our additional analysis, including the qualitative work, we provide cases of both types. In Iowa, many cities got civil service early (e.g., 1907 and 1908) because of a successful municipal reform effort, and IAFF locals began to form a few years later—perhaps with the help of civil service, but also perhaps (as we discuss below) because of the presence of mining in the state. In Washington, Wyoming, and West Virginia, however, civil service was pushed heavily by municipal employee organizations.

The examples in the article therefore help to bolster our account, that employees in many cases contributed to civil service adoption. However, with our quantitative data alone, it is difficult to establish the causal effect of IAFF. Specifically, we find that when we divide cities into cohorts based on whether they never established an IAFF local before 1940, established an IAFF local between 1900 and 1919, established an IAFF local between 1920 and 1929, or established an IAFF local between 1930 to 1940, the null hypothesis of parallel trends "pre-treatment" (meaning before IAFF establishment) is rejected ($p<0.01$), including when we condition on logged city population.[2] Perhaps most simply, looking at levels rather than trends, we find that compared to cities that got IAFF later or not at all, cities that got IAFF earlier were already *somewhat* more likely to have civil service before they got IAFF. See Table A8 below. Because of this, we do not employ the alternative estimators developed in recent literature referenced above, and we do not interpret the coefficient estimates in Tables 2 and 3 of the article as an average treatment effect.

[2] For this test, we use the csdid package in Stata. See Sant'Anna and Zhao (2020).

Table A8: Pre-trends

Period during which city established an IAFF local (city cohorts)	Proportion with civil service in 1899	Proportion with civil service in 1919	Proportion with civil service in 1929
1900-1919	0.079	0.444	0.524
1920-1929	0.053	0.368	0.421
1930-1940	0.016	0.16	0.21
No IAFF local by 1940	0.002	0.04	0.06

Notes: Proportions exclude cities in NY, MA, and OH.

This empirical pattern makes sense in the context we are examining, as we discuss in the article: First, there are theoretical reasons to think that civil service in some cases helped employees form organizations. Second, there could be unmeasured, time-varying differences between cities that did and did not organize IAFF early that are correlated with civil service adoption. Third, our IAFF indicator is a measure of employee agency, but there were almost certainly instances of employee agency that are not captured with this variable. Even so, the new quantitative dataset we analyze in the article establishes that there is a strong association between early employee organization and civil service adoption in American cities, which has not been recognized or established in past research, and our further analysis of cases and examples bolsters support for our argument that oftentimes employee advocacy was a contributor to this institutional change.

Relationship with Municipal Reform and Political Machines

In this section we look to see whether the relationship between the IAFF and civil service adoption is muted or absorbed by the presence of municipal reform or patronage-based political machines. We measure municipal reform by noting the adoption of city manager or commission government charters, the share of council seats elected at-large, and the presence of nonpartisan elections. These institutions do not correlate strongly with the presence of IAFF locals. See Table A9.

Table A9: Correlations, IAFF and reform institutions in 1940

	IAFF	Commission or council-manager	% At Large	Nonpartisan
IAFF	1			
Commission or council-manager	0.1325	1		
% At Large	0.0234	0.4752	1	
Nonpartisan	0.0257	0.3601	0.2598	1

In Table A10, column 1, we add these reform institutional measures to our base model from Table 2. In model 2 we combine these institutions to denote cities that had all three reform institutions. In model 3 we include a measure of machine organizations in the city (for a more

limited sample of cities for which the data were available). Across all models, the coefficient on IAFF remains strong and positive. Interestingly, the presence of reform institutions is not positively associated with cities having civil service by 1940. The presence of a political machine is negatively associated with civil service (as the literature suggests it should be).

Table A10: Adoption of Municipal Civil Service by 1940 and Reform

	(1)	(2)	(3)
IAFF	0.252***	0.249***	0.305***
	(0.051)	(0.054)	(0.086)
Reform Government	-0.027		
	(0.088)		
% At Large	-0.007		
	(0.081)		
Nonpartisan	0.071		
	(0.082)		
All Reform Institutions		-0.075*	
		(0.042)	
Machine			-0.269*
			(0.145)
Population (logged)	0.151***	0.152***	0.110***
	(0.022)	(0.021)	(0.030)
% Foreign born	-0.131	-0.136	-0.195
	(0.296)	(0.332)	(0.577)
% Illiterate	-1.108***	-1.081***	-0.420
	(0.323)	(0.340)	(0.714)
% Black	-0.376	-0.38	-0.300
	(0.237)	(0.228)	(0.484)
State civil service law	0.168*	0.188**	0.148
	(0.090)	(0.087)	(0.092)
R-squared	0.31	0.31	0.254
Observations	1,115	1,115	190

Notes: Dependent variable is an indicator for a civil service law in the city in 1940. OLS estimates with standard errors clustered by state in parentheses. Models include regional fixed effects. *p<0.10, **p<0.05, ***p<0.01 (two-tailed)

Variation in IAFF organization

As we explain in the article, a natural question that arises from our presentation of these new data on early municipal employee organizations is what explains the geographic and over-time variation in that independent variable. For the question and causal pathway proposed in the article, this is a good question to ask because one might be concerned that there could be some omitted variable that explains both whether a city's firefighters established an IAFF local and whether the city had civil service. However, this is also an entirely novel line of inquiry—and one that stems from one of the empirical contributions we are making in the article: our finding that in many parts of the United States, local government employees had agency, were active in

politics, and formed unions and organizations decades earlier than is often recognized. Describing this empirical pattern raises new questions about why city employees organized early in some cities and not others, and what dynamics explain that variation. We consider this an important question and one worthy of further research. It is also a big question, and as it stands, there are no existing theories of what explains this variation, and thus existing research from which we can draw.

One possibility is that early firefighter agency and organization were more likely in larger cities than in smaller cities. In models presented in Table A11 below, we show that this is the case. In column 1 of Table A11, we model whether cities established an IAFF local by 1940, with regional fixed effects. Column 2 includes state fixed effects. Column 3 models IAFF establishment by city-year with city fixed effects. All of the estimates show a positive relationship between population size and the likelihood of a city having an IAFF local.

Table A11: Modeling IAFF

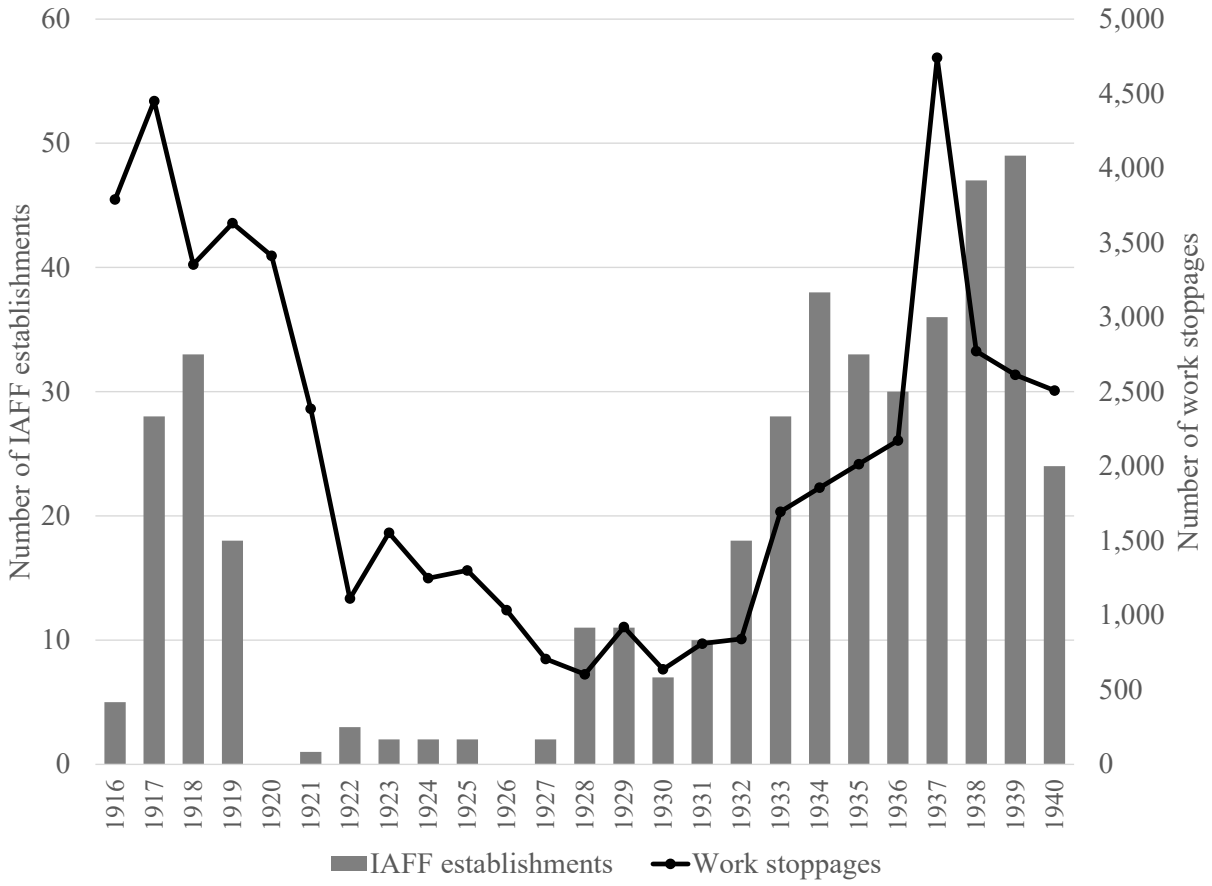
	(1)	(2)	(3)
Population (logged)	0.205***	0.201***	0.099***
	(0.018)	(0.019)	(0.008)
% Foreign born	-0.046	-0.174	
	(0.247)	(0.187)	
% Illiterate	-0.163	-0.068	
	(0.231)	(0.215)	
% Black	-0.088	-0.012	
	(0.158)	(0.196)	
State civil service law	-0.064		
	(0.056)		
Midwest	0.181*		
	(0.098)		
Northeast	-0.214**		
	(0.092)		
South	-0.061		
	(0.106)		
R-squared	0.311	0.424	0.388
Observations	1,394	1,394	57,294
Model	IAFF by 1940, region fixed effects	IAFF by 1940, state fixed effects	IAFF 1900-1940, city fixed effects

Notes: Dependent variable is presence of IAFF (in the city in 1940 in columns 1-2 and the city-year in column 3). Standard errors clustered by state in models 1 and 2 and clustered by city in model 3. *p<0.10, **p<0.05, ***p<0.01 (two-tailed)

As we explain in the article, another possible contributor to where and when IAFF was likely to establish locals was the strength of the private-sector labor movement. Most research on the labor movement and its history focuses on private-sector unions (see, e.g., the discussions in Slater (2004) and Walker (2020)), perhaps in part because the two operate under very different

legal regimes. However, as Walker (2020, chapter 2) explains, the private and public-sector labor movements had closer connections before the NLRA than is often acknowledged. Firefighters' locals, police, and some teachers (those affiliated with the AFT) had organizations that were recognized and chartered by the AFL. When the CIO split from the AFL, it supported government unions as well (Walker 2020). Thus, while the NLRA of 1935 gave public- and private-sector unions different legal status, it is not clear that unions or workers themselves saw important distinctions between the two. Even before IAFF was established in 1918, the AFL chartered firefighters' locals in a number of cities—which eventually were included in IAFF once it was created.

Figure A3: IAFF establishments and total number of work stoppages, 1916-1940



While the relationship between establishment of firefighters' locals and private-sector union strength has not itself been examined in the literature, Figure A3 shows that the temporal pattern of firefighters' local establishments we showed in Figure 3 of the article tracks closely the ebb and flow of work stoppages, which were mostly private-sector strikes. For Figure A3, we draw data from the US Bureau of Labor Statistics (1947) on the number of work stoppages by year and overlay those numbers (with a separate axis on the right) with the IAFF establishments data. Both were high during the late 1910s, then slowed during the 1920s, and surged again in the 1930s. This suggests that periods of labor movement strength and activism in the United States,

as captured by strike activity, roughly coincide with the most active periods of IAFF organization in US cities.

In addition, economic historian Thomas Holmes (2006) has found evidence that geographic regions that had large mining and steel establishments mid-century tend to have relatively high unionization rates today—even in perhaps surprising areas like Alabama, and even in industries that were not prominent or unionized mid-century. Holmes proposes that unions have spillover effects: that once unions are established and have high membership in certain areas, there is a tendency for those unions to seek to organize other workers in the same area, and thus for unionization to spread in geographically proximate places, especially during this time period. Holmes in particular notes that close to 100% of workers in large mines and steel mills were in unions by the 1950s. He presents evidence that in recent decades, even as those mining and steel establishments have shrunken or disappeared, workers in healthcare and grocery stores have higher unionization rates in those areas, such as around Birmingham, Alabama.

This theoretical insight has not yet been proposed as a possible explanation for patterns of public-sector unionization, but we think it plausible that these early unions in mines and steel mills could also have helped firefighters' locals to organize. As we explain in the article, of the nine cities in our dataset that were the first to establish firefighters' locals affiliated with the AFL (which became IAFF locals a few years later), all were in close proximity to mining and steel operations. The earliest were in Pittsburgh, PA, and Chicago, IL—both large cities, but also cities with large, prominent steel mills. Pittsburgh organized the first firefighters' local in 1903, AFL Local 11461, which later became IAFF Local 1.[3] Chicago firefighters established AFL No. 12270, which later became IAFF Local 2. On its Facebook page, IAFF Local 2 notes the following in its account of its history: "The association with the AFL allowed the Chicago Firefighters to work within the trade Union movement in Chicago and nationally to bring attention to the long hours and minimum pay that Firefighters received."[4] Mckeesport, PA, in the Pittsburgh metro area and a steel town as well (Noakes 2021), also established an IAFF local in 1916.

Another early firefighters' local was established in Pueblo, CO, in 1912, which by the 1880s was engaged in processing iron ores that were mined in nearby Leadville. Pueblo also had a large steel mill, the Colorado Coal & Iron Company. Pueblo was selected as the site of the steel mill because of its close proximity to coal, limestone, and the railroad.[5]

---

[3] See "International Association of Fire Fighters (IAFF): A History of Firefighter Unions," Marin Professional Firefighters, https://iaff1775.org/our-union/iaff-affiliation/2202-a-history-of-firefighter-unions (accessed March 23, 2023).

[4] "Chicago Fire Department Firefighters Union - Local 2," https://m.facebook.com/ChicagoFireDepartment/photos/a.113748248962317 4/505315438472261 2/ (accessed March 23, 2023).

[5] History Colorado, Colorado Encyclopedia, "Pueblo," https://coloradoencyclopedia.org/article/pueblo-0 (accessed March 23, 2023); City of Pueblo, Colorado, "History of Pueblo," https://www.pueblo.us/119/History-of-Pueblo (accessed March 23, 2023).

Three other cities that established IAFF locals by 1916 were in Iowa: Des Moines (1913), Cedar Rapids (1916), and Council Bluffs (1916). As we discuss in the article, several cities in Iowa, including these three, adopted civil service early, around 1908, alongside the full package of reform-style institutions. This, then, is an example of a state where civil service was spread in large part because of reform efforts. That said, the state also had cities that had early IAFF locals, and there was also considerable coal mining in the state at the time. Coal production in Iowa peaked just before 1920 and then began to decline as the railroads began to buy coal from other states, such as Kentucky.[6]

The other two cities that were among those that had established IAFF locals by 1916 were Great Falls, MT, and Wheeling, WV. Great Falls, MT, was home to a smelter called the "Big Stack" that refined raw minerals that were extracted from Butte (which also established an IAFF local early, in 1918, and was connected to Great Falls by the railroad).[7] Wheeling, WV, was a steel city, part of the iron and steel region called the "Middle District." In 1897, there was a national labor convention in Wheeling where a nationwide coal strike was discussed, and one of the speakers was Samuel Gompers, founder of the AFL (see White 1932).

1917 and 1918 also saw a surge in IAFF local establishments around the country, including in cities like Bellingham, WA, and Birmingham, AL, which were also mining centers.

These examples suggest this could have been one possible contributor to patterns of the establishment of IAFF locals in the earliest years: proximity to mining and steel production, which had high rates of unionized workers. To explore this possibility quantitatively in a preliminary matter, in the article, we describe how we have used data from the 1940 Census on the number of workers in each county employed in mining. We note that this only approximates what we are interested in. For example, we would rather have data on mining employment in 1920, because in many regions where mining was prominent in 1920, such as in Bellingham, WA, and Iowa, the mining industry had already declined substantially by 1940. However, the Census data from earlier years such as 1920 do not have mining employment data broken down by county, which we rely on for our analysis in the article. Even with this caveat considered, however, there does appear to be a connection between mining employment and where the earliest IAFF locals were established.

---

[6] Malcolm Price Laboratory School, University of Northern Iowa, Cedar Falls, Iowa, 2003, "Coal Mining in Iowa, 1870-1940," Explorations in Iowa History Project, https://iowahist.uni.edu/Social_Economic/CoalMining_inIowa/coal_mining_in_iowa.htm (accessed March 28, 2023).

[7] "Tenacity: The Miners of Great Falls," Visit Great Falls, Montana, https://visitgreatfallsmontana.org/2017/07/20/tenacity-miners-great-falls/ (accessed March 23, 2023).

References

Callaway, Brantly, and Pedro H. C. Sant'Anna. 2021. "Difference-in-Differences with Multiple Time Periods." *Journal of Econometrics* 225(2): 200-230.

de Chaisemartin, Clément, and Xavier D'Haultfoeuille. 2020. "Two-Way Fixed Effects Estimators with Heterogeneous Treatment Effects." *American Economic Review* 110(9): 2964-96.

de Chaisemartin, Clément, and Xavier D'Haultfoeuille. 2023. "Two-Way Fixed Effects and Differences-in-Differences with Heterogeneous Treatment Effects: A Survey." *The Econometrics Journal* 26(3): C1-C30.

Goodman-Bacon, Andrew. 2021. "Difference-in-Differences with Variation in Treatment Timing." *Journal of Econometrics* 225(2): 254-277.

Holmes, Thomas J. 2006. "Geographic Spillover of Unionism." National Bureau of Economic Research Working Paper 12025.

Imai, Kosuke, and In Song Kim. 2021. "On the Use of Two-Way Fixed Effects Regression Models for Causal Inference with Panel Data." *Political Analysis* 29(3): 405-415.

Moore, Lyman S. 1938. "Organizations of Local Government Employees." In *The Municipal Year Book 1938*, edited by Clarence F. Ridley and Orin F. Nolting, 339-343. Chicago: International City Managers' Association.

Noakes, Taylor C. 2021. "The History and Possible Futures of an American Steel Town." *Belt Magazine*, September 28, https://beltmag.com/tag/mckeesport/.

Ridley, Clarence E., and Orin F. Nolting, eds. *The Municipal Year Book 1940.* Chicago: International City Managers' Association.

Roth, Jonathan, Pedro H. C. Sant'Anna, Alyssa Bilinski, and John Poe. 2023. "What's Trending in Difference-in-Differences? A Synthesis of the Recent Econometrics Literature." *Journal of Econometrics* 235(2): 2218-2244.

Sant'Anna, Pedro H. C., and Jun Zhao. 2020. "Doubly Robust Difference-in-Differences Estimators." *Journal of Econometrics* 219(1): 101–22.

Slater, Joseph E. 2004. *Public Workers: Government Employee Unions, the Law, and the State, 1900-1962*. Ithaca, NY: Cornell University Press.

United States Bureau of Labor Statistics, Department of Labor. 1947. "Work Stoppages Caused by Labor-Management Disputes in 1946." Bulletin No. 918.

Walker, Alexis N. 2020. *Divided Unions: The Wagner Act, Federalism, and Organized Labor*. Philadelphia: University of Pennsylvania Press.

White, Langdon. 1932. “Iron and Steel Industry of Wheeling, West Virginia.” *Economic Geography* 8(3): 274–81.